Buckling and post buckling characteristics of laminated composite plates with damage under thermo-mechanical loading

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Buckling and post buckling characteristics of laminated composite plates with damage under thermo-mechanical loading

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ABSTRACT

The present work addresses the development of a finite element formulation for handling bending, buckling, and post buckling analysis of composite laminated structures with damage. The inverse hyperbolic shear deformation theory (IHSDT) was applied in the finite element formulation. The effect of damage is analysed for thin composite plates. An anisotropic damage formulation was used to simulate the damage, which is based on the concept of stiffness reduction. Computer programming is developed in the MATLAB environment. The excellent agreement of the results obtained in the present method with those from references shows that the technique is effective and precise. Parametric studies in the buckling behaviour of a damaged composite plate are presented. Critical buckling temperatures are computed for a damaged plate using the present model. Thermal post buckling equilibrium paths are traced for various parametric variations for composite plates with mild damage and compared the results with that of undamaged cases. The validation of IHSDT has been demonstrated for buckling analysis in thermal environment for composite plates with an internal flaw. The present work is worthwhile compared with previous works due to the choice of finite element method and inverse hyperbolic shear deformation theory for analyzing the influence of damage on buckling and post buckling behavior of laminated plates.

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